



# *System Diagnostic Approach for Tracking HVAC Performance*

September 7, 2000

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# Presentation Overview

- Original Whole Building COP Concept
- Challenges of Whole Building COP
- Development of System Diagnostic Approach
- System Diagnostic Application

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# Whole Building COP Approach

- Ratio of Energy Inputs and Outputs
- Typically System Level Value
- Application Examples

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# COP Challenges at Ann Arbor

- Chiller / Heater Operation not Season Dependant
- Loss of Resolution with Whole Building COP
- Lack of Established Performance Metrics for Laboratories

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# System Diagnostics

- Snapshot of System Performance
- Baseline for Model Operation
- Component Based Measurement
- Repeatable Test Conditions
- System Flags for Inefficient Operation

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# System Diagnostic Application

- Test Cell Heating & Cooling
- Heat Wheel Effectiveness
- Central Plant Heating & Cooling
- Fuel Cell Efficiency

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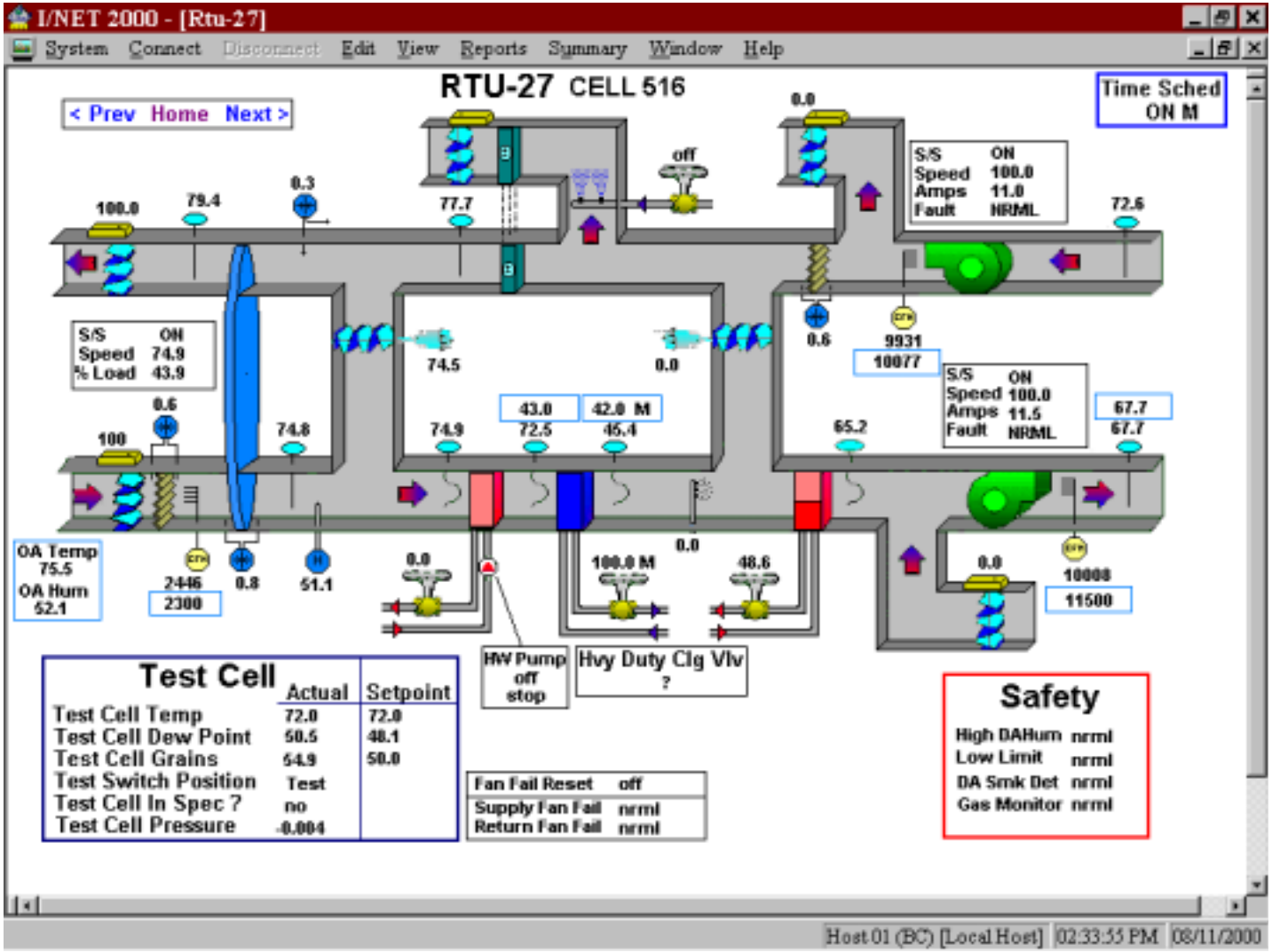
# Typical Laboratory Test Cell AHU



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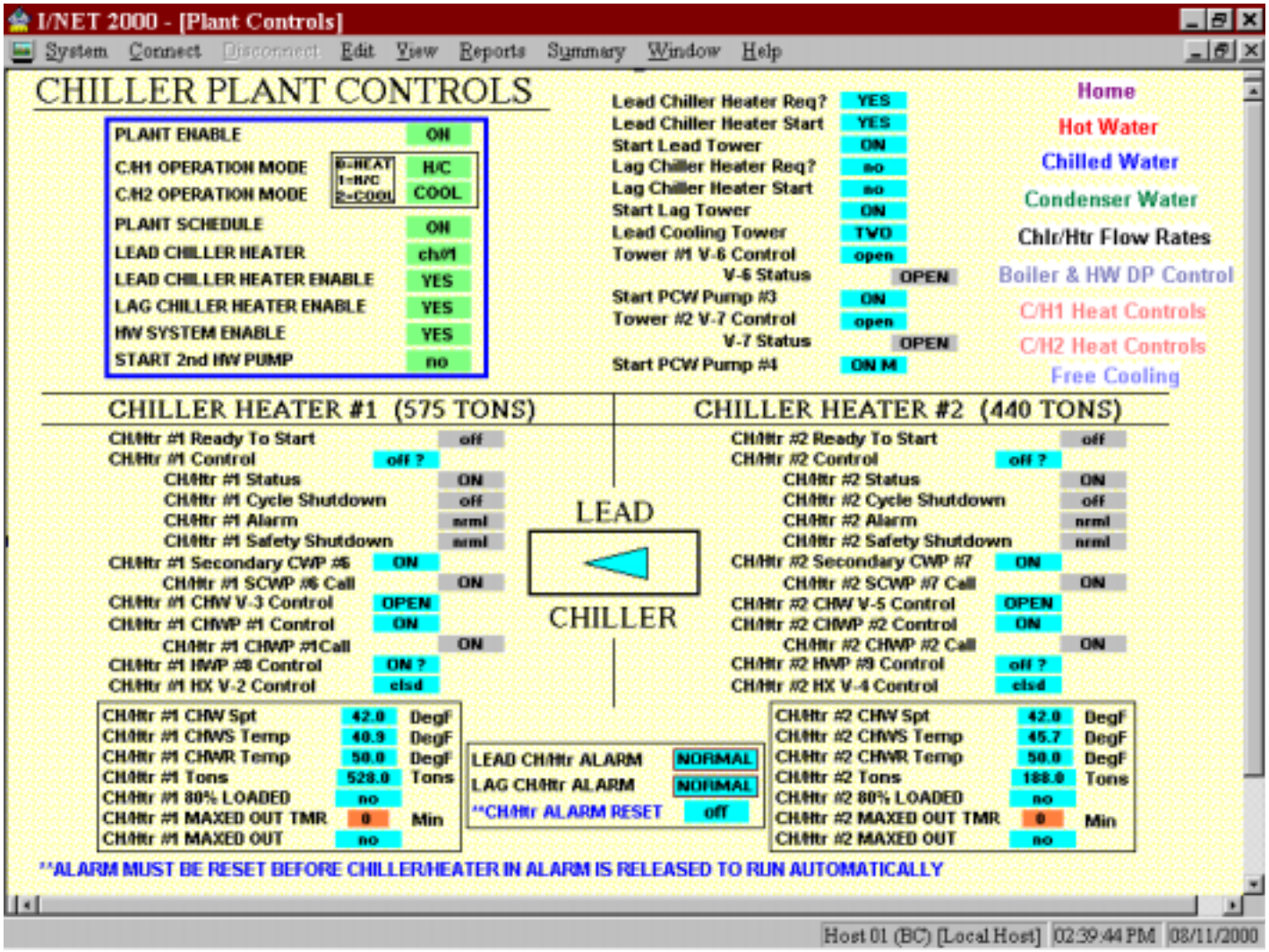
# Central Plant Control Screen



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# Fuel Cell Efficiency

**Fuel Cell Efficiency equals the sum of the KW output plus the Waste Heat Energy divided by the Energy of the fuel consumed**

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# Concept Status

- Currently programming logic
- Component operation will be trended during initial commissioning
- Ongoing results will be reviewed for further tuning of diagnostic approach


# Thank You!